

Effects on Salinity in the Southern Delta

2007

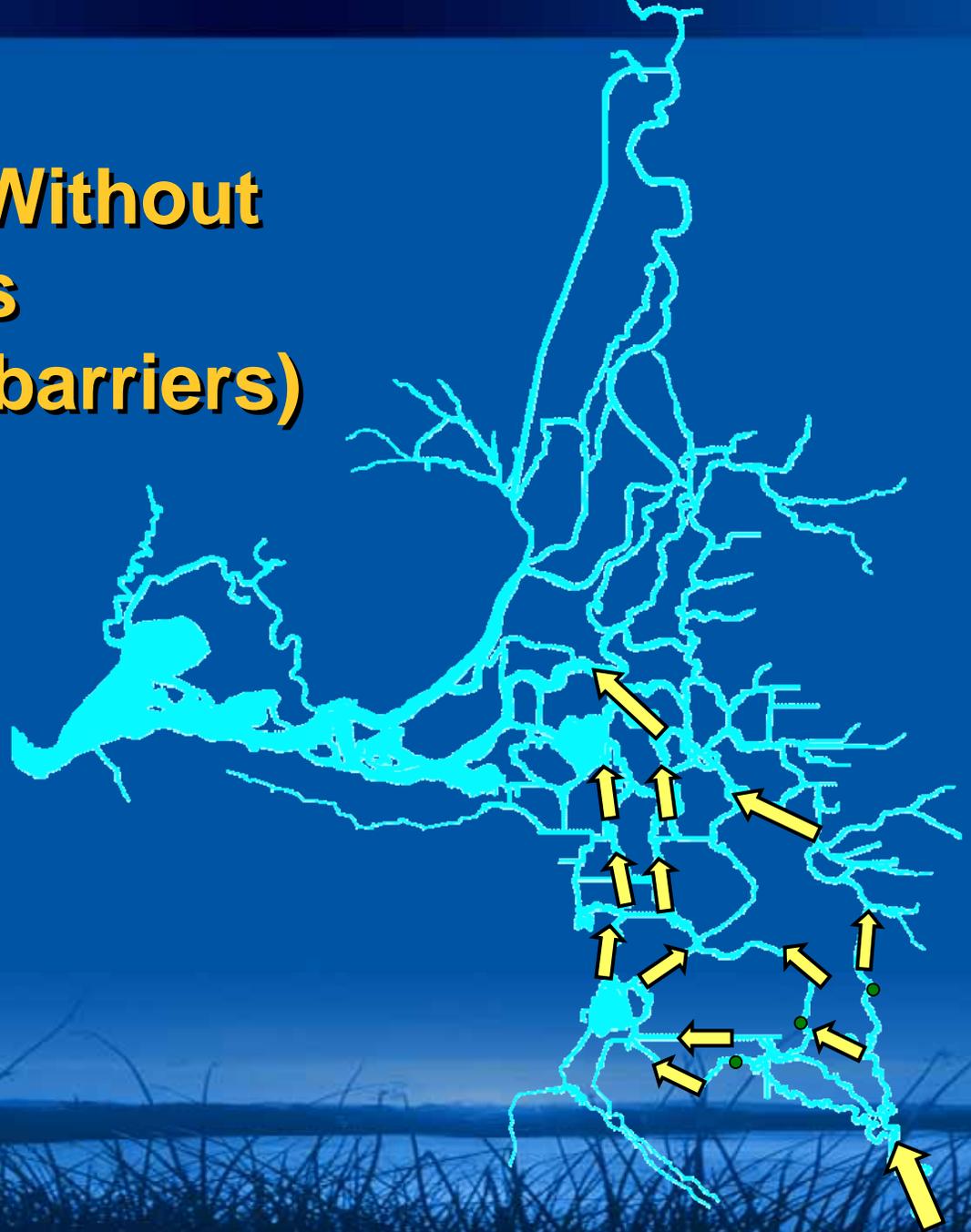


Department of Water Resources

Objective of Presentation

- Investigate whether State operations (changing Sacramento River Flow and/or Pumping) can influence the South Delta Salinity
 - Show flow patterns in the Delta
 - Show the effects of drastic changes in project operations
 - Show effects of temporary barriers and permanent gates by using particle tracking animations

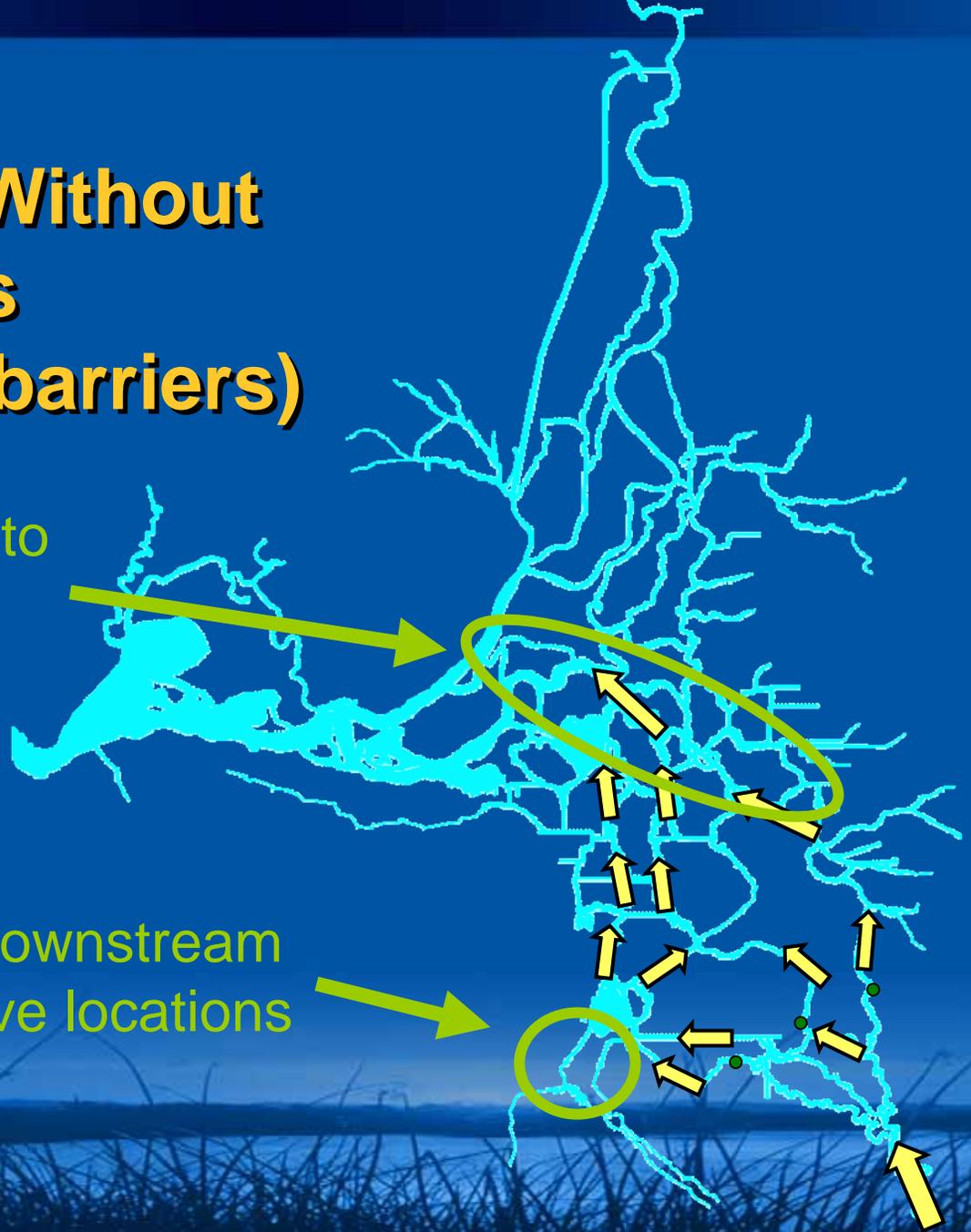
Flow Pattern Without Exports (no temporary barriers)



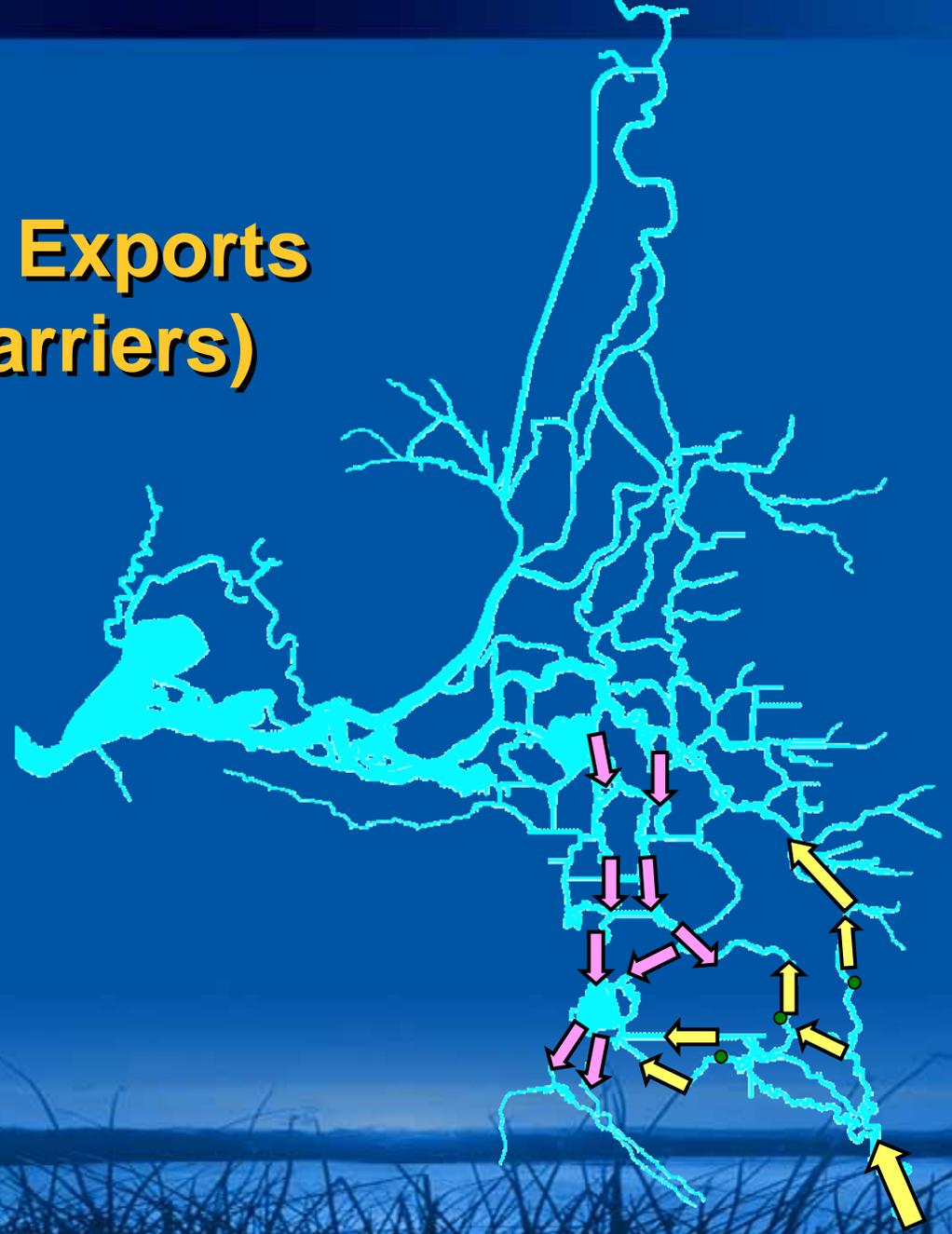
Flow Pattern Without Exports (no temporary barriers)

Influence of Sacramento River downstream of objective locations

Exports downstream of objective locations



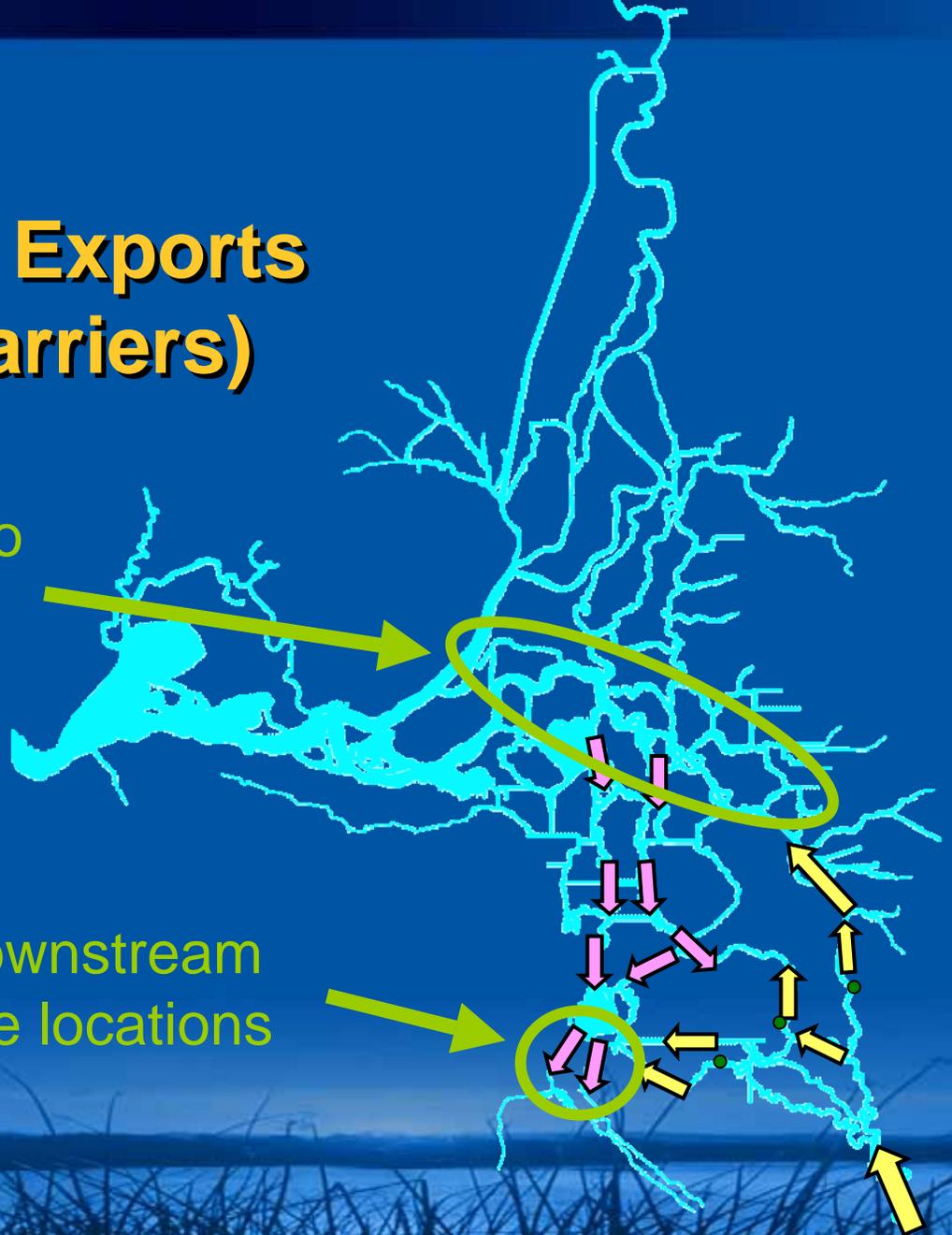
Flow Pattern With Exports (no temporary barriers)



Flow Pattern With Exports (no temporary barriers)

Influence of Sacramento
River downstream of
objective locations

Exports downstream
of objective locations



**Flow Pattern With Exports
(with two agricultural
temporary barriers and
barrier at Head of Old
River)**



Flow Pattern With Exports (with three agricultural temporary barriers)



Modeled SWP Export Effects on Salinity (as Compared to Modeled Historical)

DSM2 Modeling Study	With Barriers	When Barriers are not Installed
Increase and Decrease in SWP exports by 500 cfs (1991-2005)	No significant differences. (Decreases in exports do not always result in degradation).	No significant differences. (Decreases in exports do not always result in degradation).
Elimination of SWP Exports (2002)	Slight degradation then improvement at Old River at Tracy. No significant differences at Brandt Bridge or Old River at Middle River	No significant differences
Elimination of SWP Exports (2003)	Slight degradation at Old River at Tracy. No significant differences at Brandt Bridge or Old River at Middle River.	No significant differences

Can affect but can't control salinity by changing SWP exports

Modeled Export, Barriers, and Sacramento Flow Effects on Salinity

- **DSM2 Simulations (Appendix C)**

- 2002 Historical simulation

- No CVP or SWP exports and no temporary barriers (modified 2002 historical)

- No SWP exports and no temporary barriers (modified 2002 historical)

- Additional Sacramento Flow of 5000 cfs ,Apr through Aug (modified 2002 historical)

- **Why 2002?**

- Builds upon work presented previously

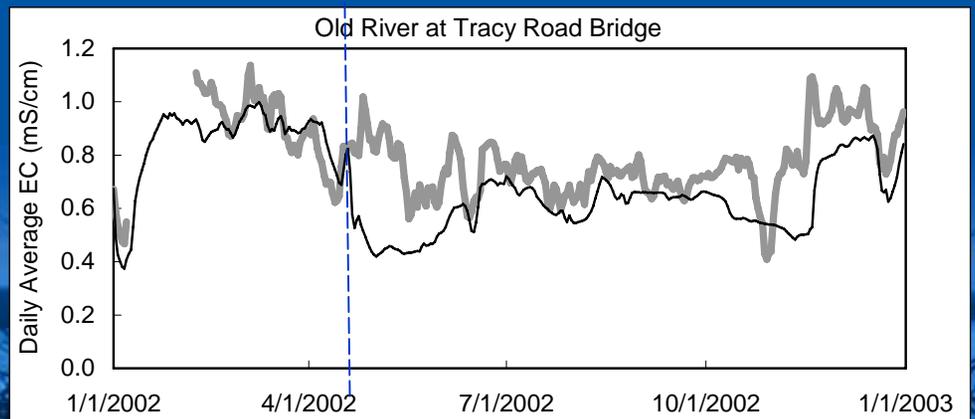
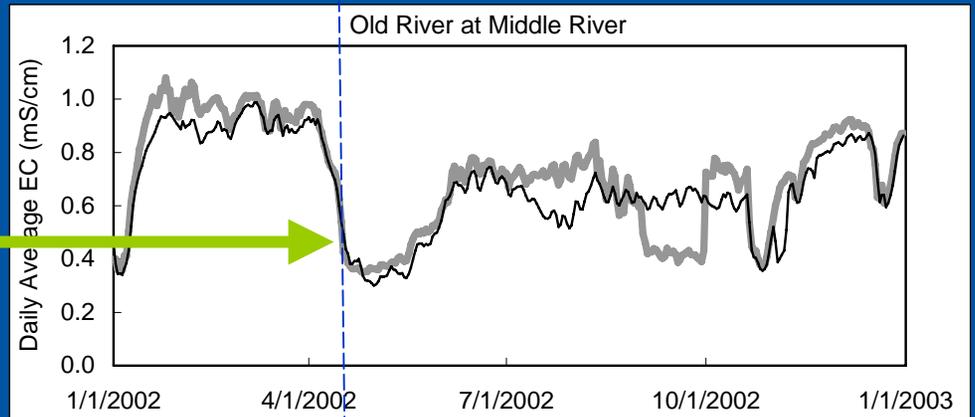
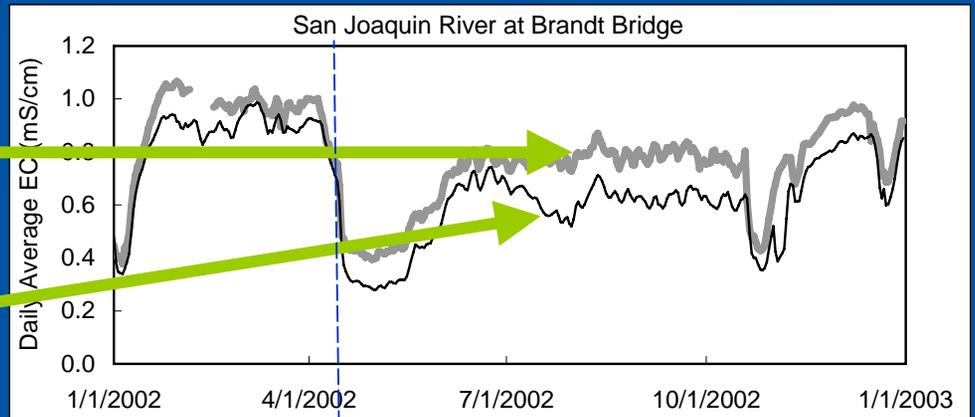
- See how well the model performs (results can be compared with observed data)

DSM2 Simulations and Observed Data

Observed

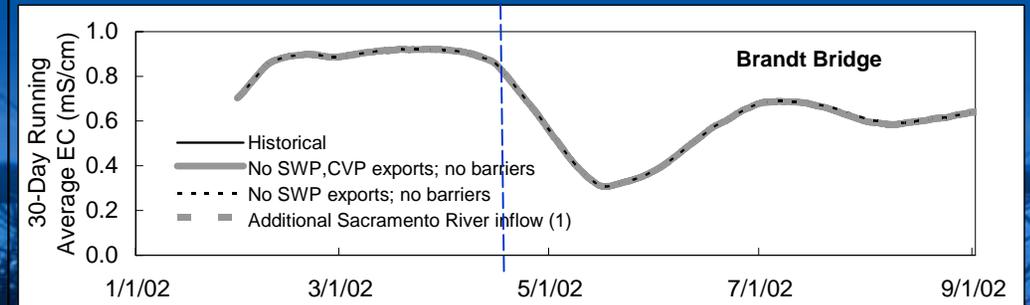
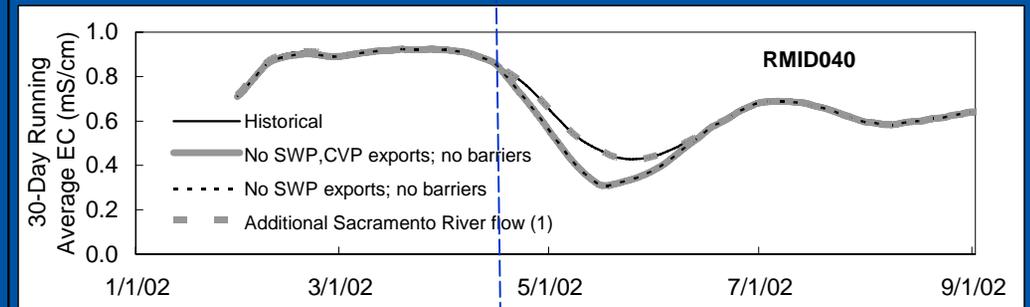
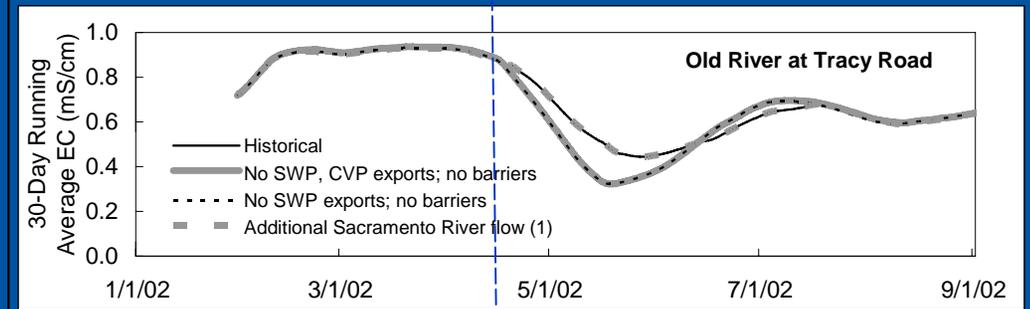
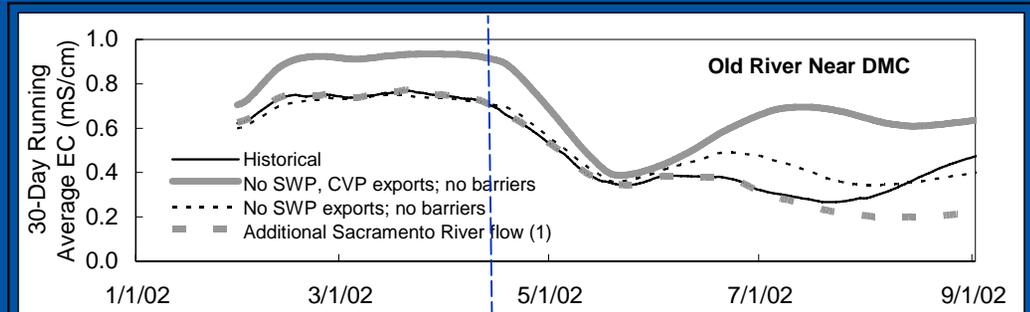
DSM2 Historical

Temporary Barrier Installation

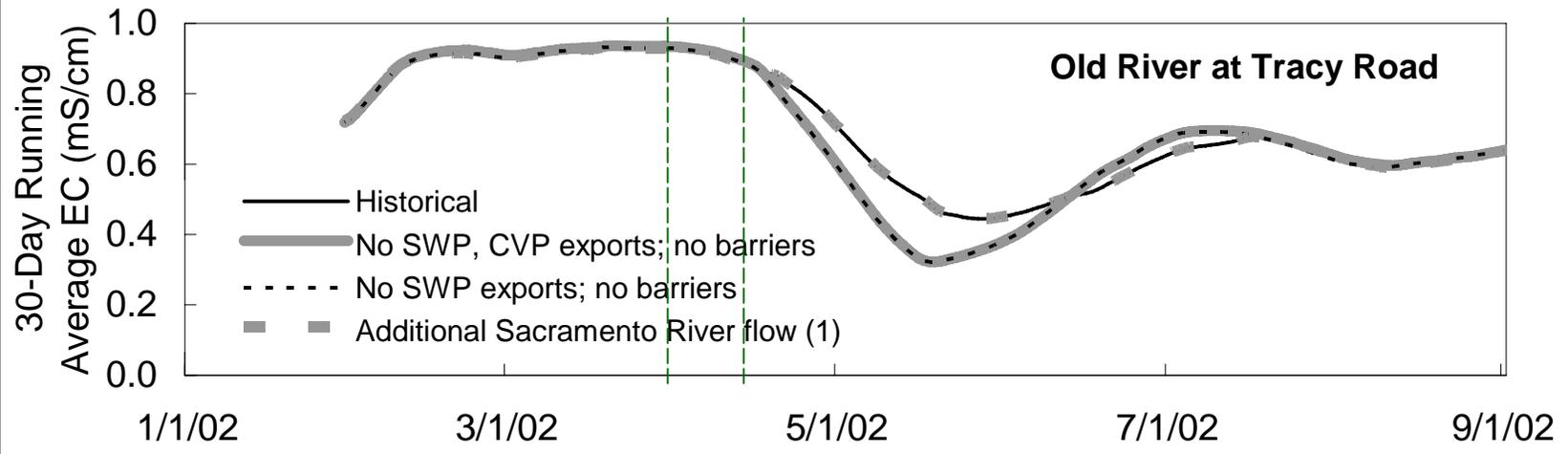


DSM2 Simulations

- Four Simulations
 - DSM2 2002 Historical
 - No SWP and CVP exports, no barriers
 - No SWP exports and no barriers
 - Additional Sacramento Flow (5000 cfs)



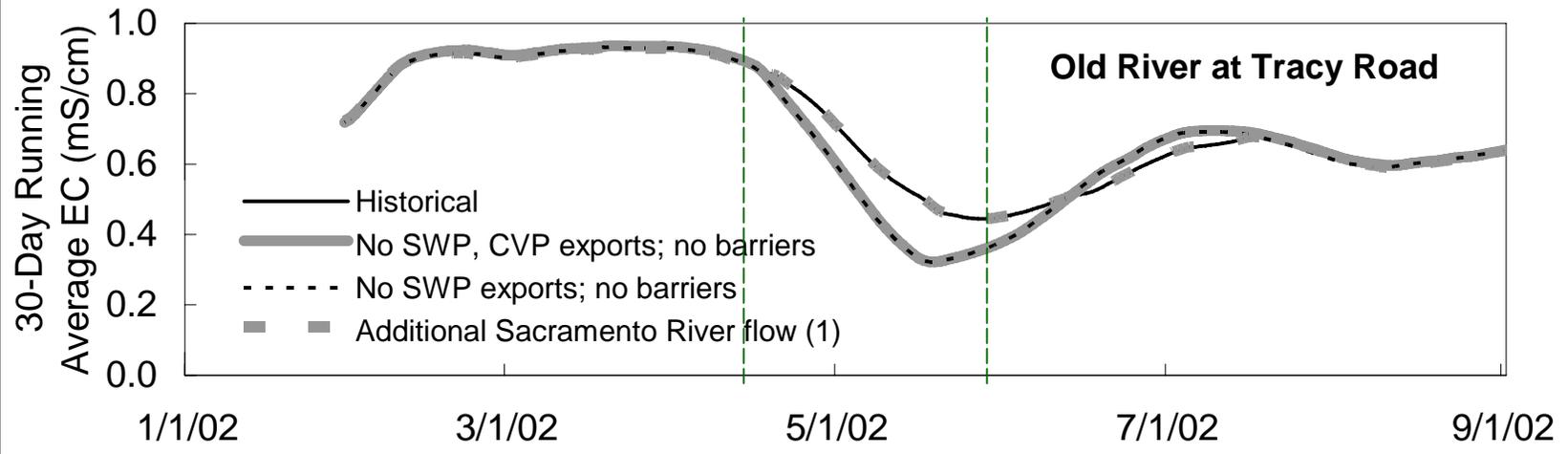
(1) Sac River inflow increased 5,000 cfs over historical flow for April - Sep of 2002.



No SWP, CVP exports; no barriers,
April 1 –15



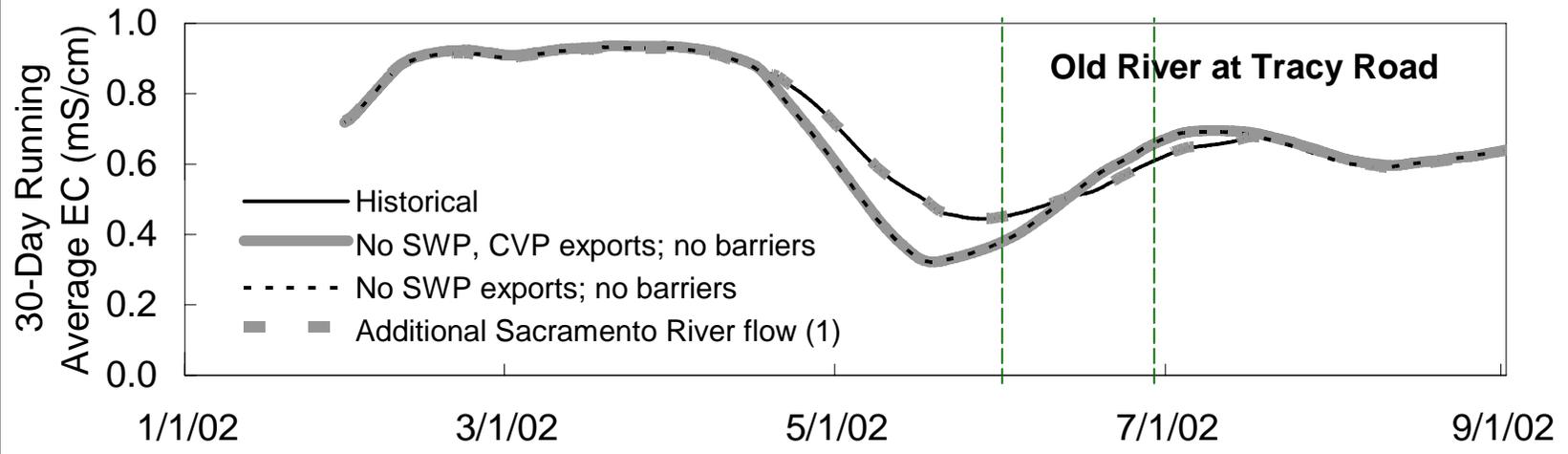
Historical Simulation (exports,
no barriers) April 1 - 15



No SWP, CVP exports; no barriers,
April 15 – May 24



Historical Simulation (exports,
barriers) April 15- May 24

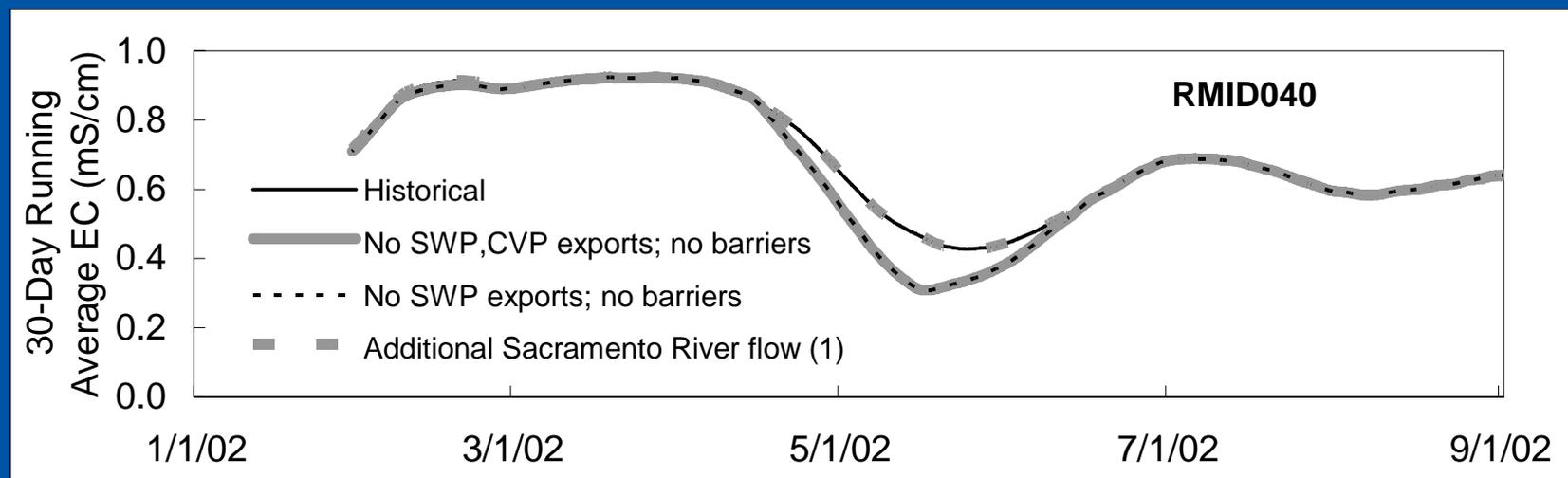


No SWP, CVP exports; no barriers,
June 7-30, 2002



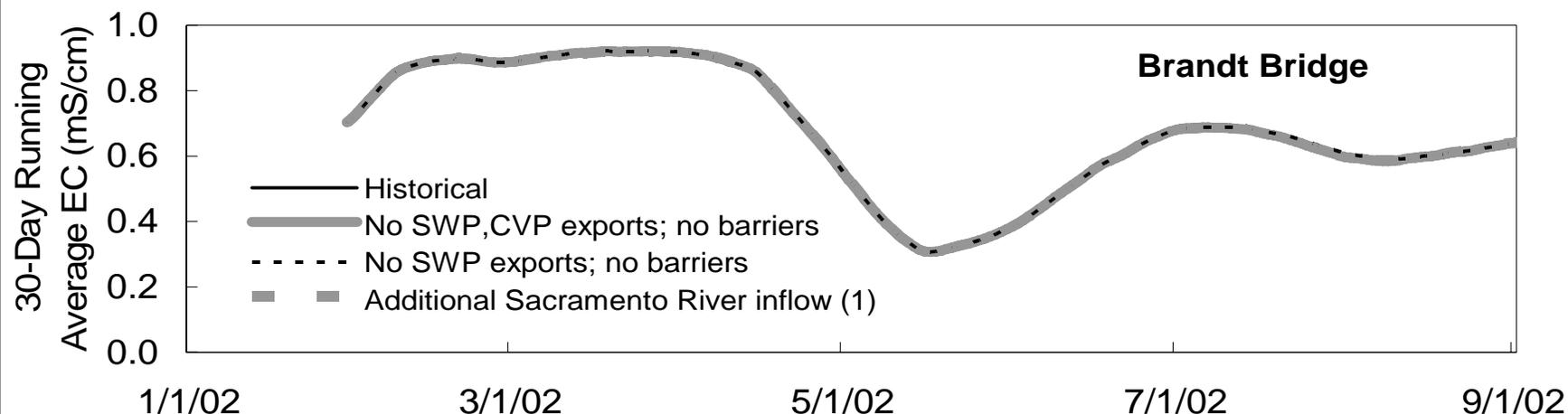
Historical Simulation (exports,
barriers) June 7-30, 2002

DSM2 Simulations (cont)



- RMID040 (one mile downstream of Old River at Middle River)
 - Differences reflect movement of water upstream due to barriers

DSM2 Simulations (cont)

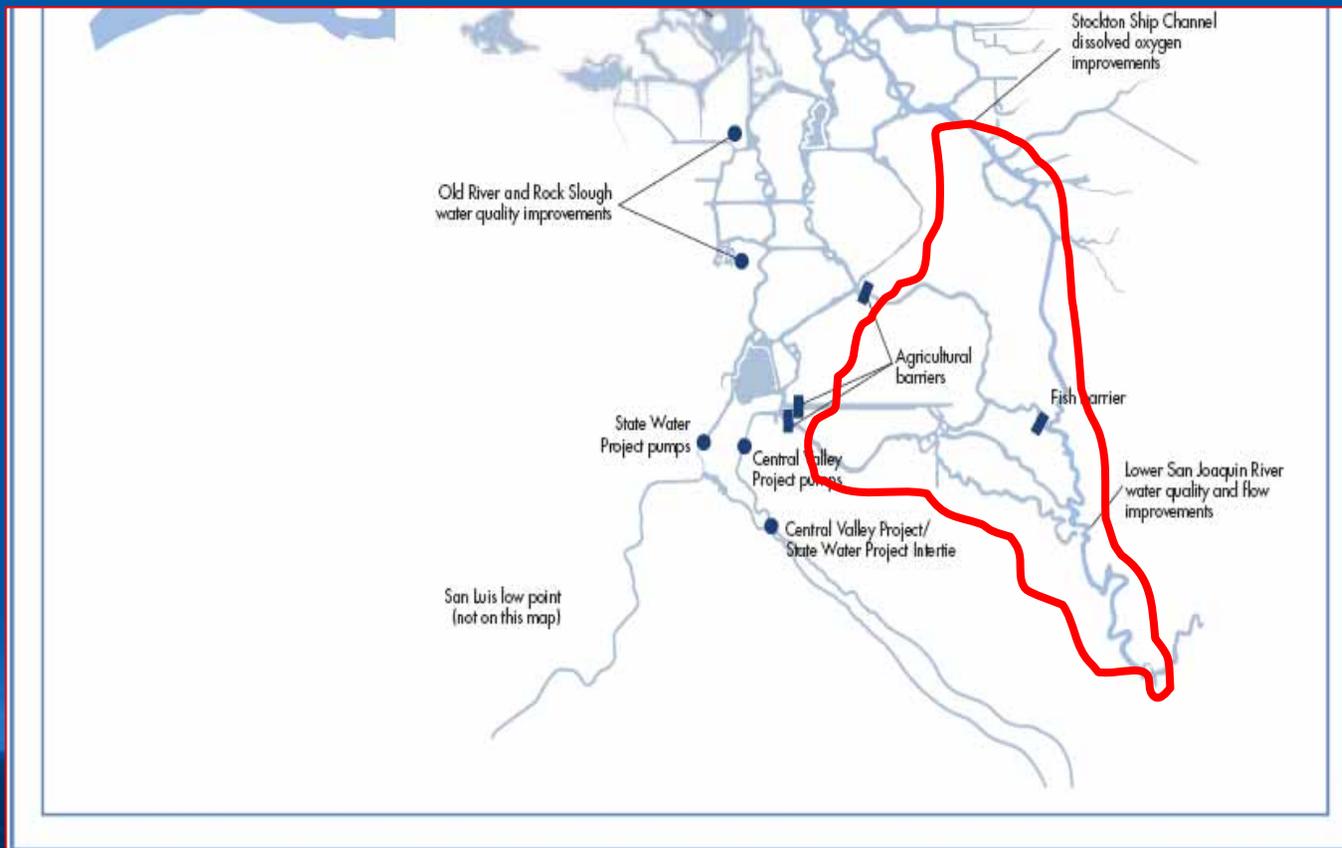


- Brandt Bridge
 - No Significant difference in results between the four simulations

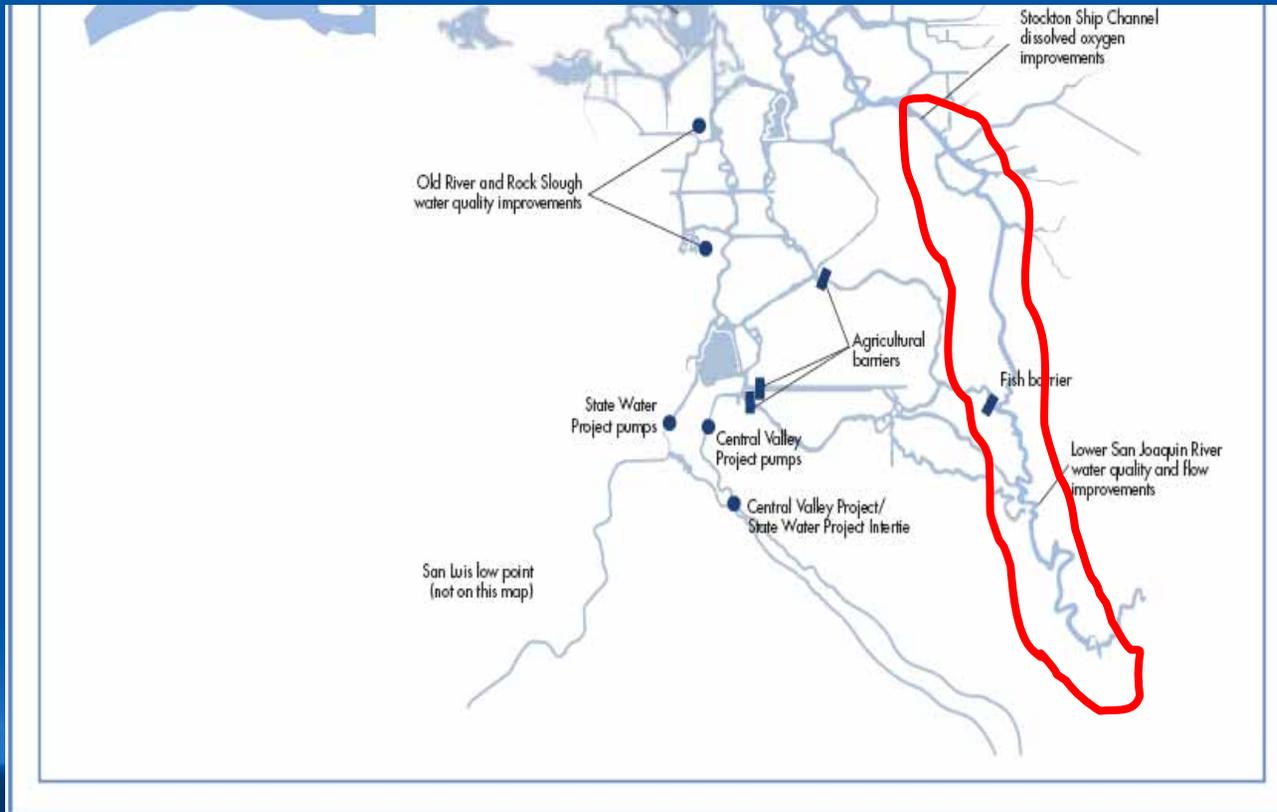
Four PTM Animations

- Temporary Barriers
 - 1- High Pumping
 - 2- Low Pumping
 - 3- No Pumping+Increase Sacramento R. Flow
 -
- Permanent Gates
 - 4- Intermediate Pumping

Zone of San Joaquin River Dominance (Temporary Barriers)



Zone of San Joaquin River Dominance (Permanent Gates)



Conclusions

- Water Quality in the South Delta is primarily dominated by the San Joaquin River and in Delta Sources
- Reduction in exports and/or additional Sacramento flows alone cannot cause significant changes in water quality at the south Delta objective locations.
- Circulation of “Sacramento side” water can be moved upstream to affect the water quality at two of the three objective locations by the use of temporary barriers or permanent gates. Permanent gates provide a more effective means to provide circulation.
- Water Quality at Brandt Bridge cannot be significantly affected by changes in Sacramento flow, export reduction, or gates

Extra Slides



No Exports

Simulation of No SWP, CVP Exports, No South Delta Barriers Scenario
 April 15 - 30, 2002
 Period-average Flow Direction & Period-End Fingerprint/Water Quality

Period Average Inflows/Exports (cfs)

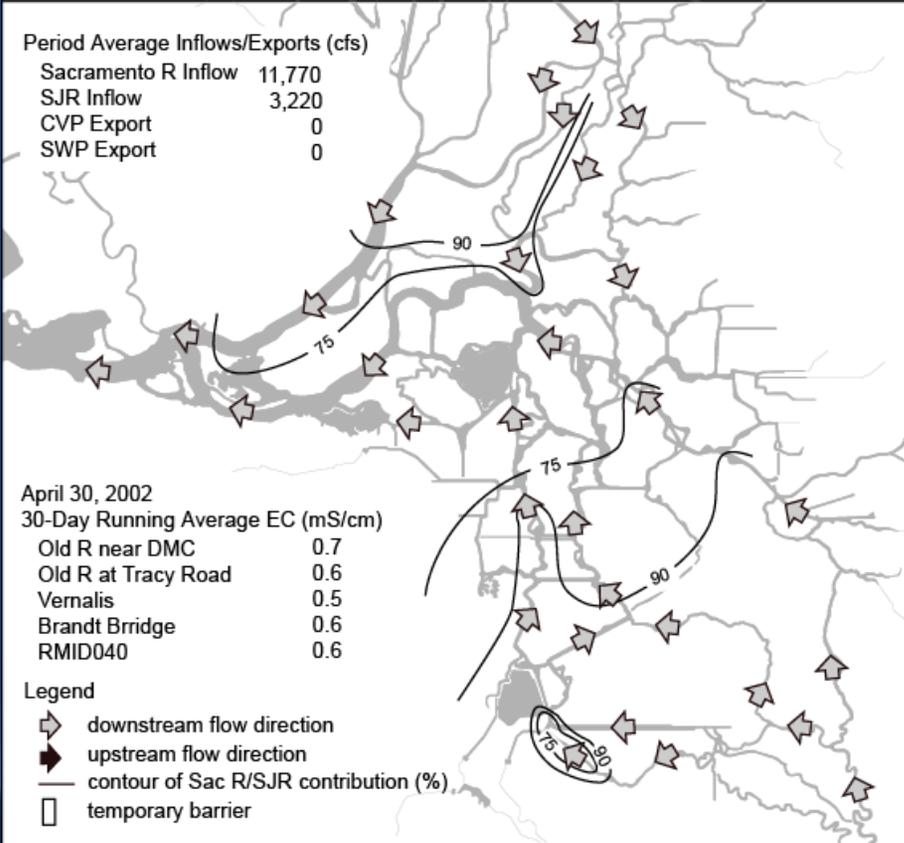
Sacramento R Inflow	11,770
SJR Inflow	3,220
CVP Export	0
SWP Export	0

April 30, 2002
 30-Day Running Average EC (mS/cm)

Old R near DMC	0.7
Old R at Tracy Road	0.6
Vernalis	0.5
Brandt Brridge	0.6
RMID040	0.6

Legend

- ◄ downstream flow direction
- upstream flow direction
- contour of Sac R/SJR contribution (%)
- temporary barrier



Simulation of Historical Conditions
 April 15 - 30, 2002
 Period-Average Flow Direction & Period-End Fingerprint/Water Quality

Period Average Inflows/Exports (cfs)

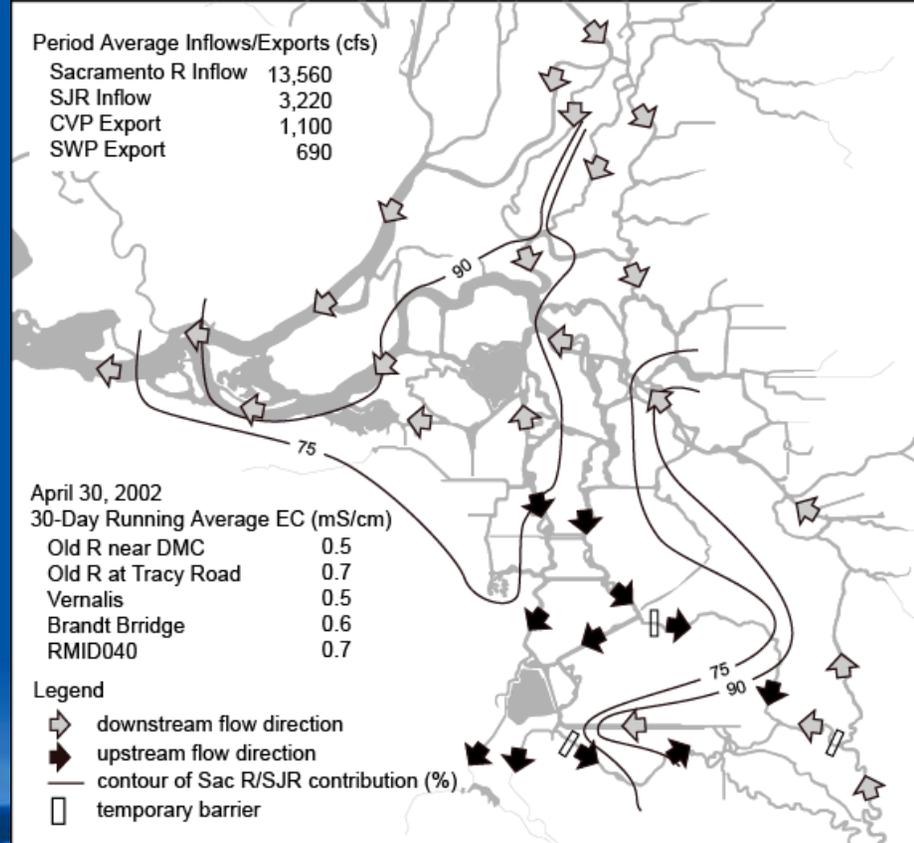
Sacramento R Inflow	13,560
SJR Inflow	3,220
CVP Export	1,100
SWP Export	690

April 30, 2002
 30-Day Running Average EC (mS/cm)

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Old R at Tracy Road	0.7
Vernalis	0.5
Brandt Brridge	0.6
RMID040	0.7

Legend

- ◄ downstream flow direction
- upstream flow direction
- contour of Sac R/SJR contribution (%)
- temporary barrier



Extra Sacramento Flow

Simulation of Additional 5,000 cfs Sacramento R. Flows April-Aug Scenario
 April 15 - 30, 2002
 Period-Average Flow Direction & Period-End Fingerprint/Water Quality

Period Average Inflows/Exports (cfs)

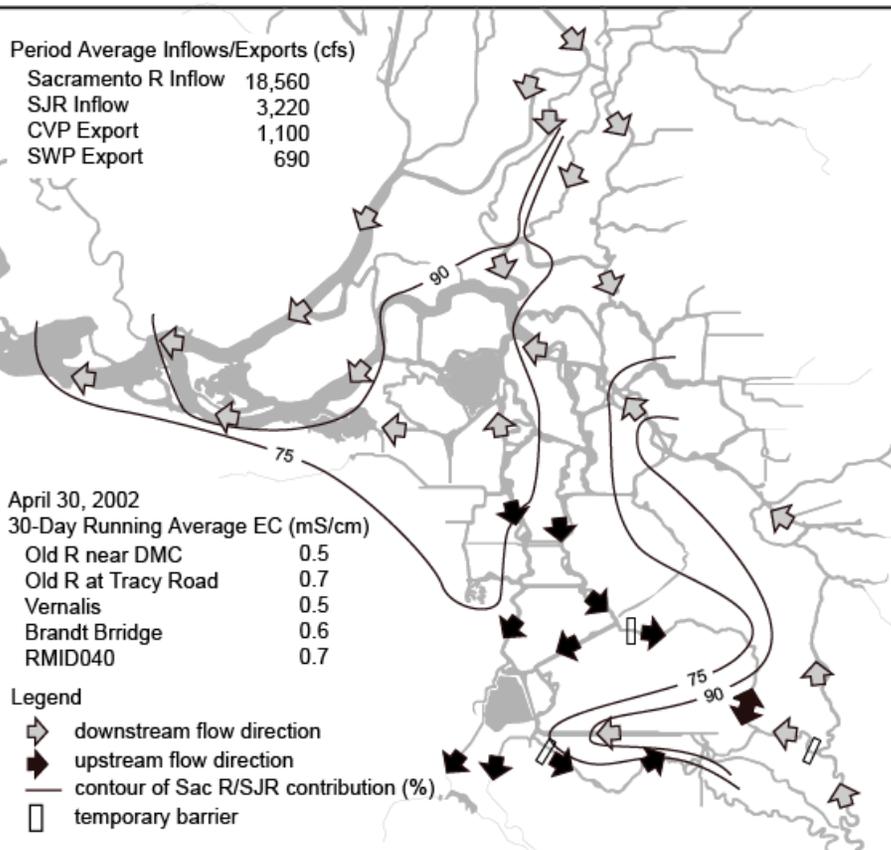
Sacramento R Inflow	18,560
SJR Inflow	3,220
CVP Export	1,100
SWP Export	690

April 30, 2002
 30-Day Running Average EC (mS/cm)

Old R near DMC	0.5
Old R at Tracy Road	0.7
Vernalis	0.5
Brandt Bridge	0.6
RMID040	0.7

Legend

- ◄ downstream flow direction
- upstream flow direction
- contour of Sac R/SJR contribution (%)
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- ◄ downstream flow direction
- upstream flow direction
- contour of Sac R/SJR contribution (%)
- temporary barrier

